

Prevalence of Type-2 Diabetes in Patients with Hepatitis C and B Virus Infection in Jeddah, Saudi Arabia

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Key Words

Type-2 diabetes · Hepatitis C · Hepatitis B · Saudi Arabia

Abstract

Objectives: To determine the prevalence of type-2 diabetes mellitus (DM) in patients with hepatitis C virus (HCV) and B virus (HBV) infections. **Materials and Methods:** A cross-sectional study of HCV- and HBV-positive patients admitted to King Abdul Aziz University Hospital, Jeddah, Saudi Arabia, was conducted from January 1999 to September 2000. The following data were collected and analysed: demographic data, the presence and type of DM, details of the treatment, body mass index (BMI), family history of DM, serum transaminases, thrombocytopenia, and presence of liver cirrhosis on liver biopsy. A total of 399 patients were included in the study. **Results:** 165 (41%) were anti-HCV positive and 234 (59%) were HBsAg positive. Type-2 diabetes was present in 35 of 165 (21.2%) patients with HCV infection, and 33 of 234 (14.1%) with HBV infection. 94% of anti-HCV-positive type-2 diabetes were older than 40 years and 6% were younger, while for nondiabetics the corresponding percentages were 55 and 45%, respectively. 76% of HBsAg-positive type-2 diabetics were older than 40 and 24% were younger, while the corresponding percent-

ages for nondiabetics were 27 and 73%, respectively. Anti-HCV-positive type-2 diabetics, when compared to nondiabetics, had a higher BMI, a frequent family history of DM, elevated serum transaminases, thrombocytopenia, and liver cirrhosis on biopsy. HBsAg-positive type-2 diabetics had only a more frequent family history of DM than did nondiabetics. **Conclusion:** Our findings indicate that type-2 diabetes is more common in patients with an HCV than with an HBV infection.

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Introduction

Diabetes mellitus (DM) and chronic hepatitis C virus (HCV) and B virus (HBV) infections are relatively common disorders. In Saudi Arabia prevalences of 7.4, 2.3, and 5.2% have been reported for DM, HCV and HBV infections, respectively [1-3]. A higher prevalence of type-2 DM has been observed in patients infected with HCV than in those infected with HBV [4-9]. However, the prevalence of type-2 DM in HCV and HBV infections has not been reported in Saudi Arabia. The aim of this study, therefore, was to determine the prevalence of type-2 DM in patients with HCV and HBV infections.

Materials and Methods

A cross-sectional study of HCV- and HBV-positive patients admitted to King Abdul Aziz University Hospital, Jeddah, Saudi Arabia, was conducted during the period of January 1999 to September 2000. Laboratory records of 413 patients for whom HCV and HBV serology was done were reviewed. Fourteen were excluded, as the presence of DM could neither be confirmed by anamnesis nor by the presence of hyperglycemia; the remaining 399 patients were included in the study. The presence of anti-HCV and HBs antigens was assessed using the microparticle enzyme immunoassay. Medical records were reviewed and the following data were collected: patient's age, sex, nationality, body mass index (BMI) measured in kg/m²; the presence of DM was diagnosed either by a history of DM, or a fasting blood glucose >7 mmol/l, or a random blood glucose >11.1 mmol/l, type (1 or 2) and treatment (diet only, oral hypoglycemic agents, insulin, or combined). In addition to a family history of DM, elevated serum transaminases (>3-fold), thrombocytopenia (<100 × 10⁹ cells/l), and presence of liver cirrhosis on liver biopsy were recorded.

Statistical Analysis

A general descriptive analysis was performed to compare type-2 DM patients with HCV and HBV infections to nondiabetics. The χ^2 test was used for categorical variables, and the Student t test for continuous variables. All statistical analyses were performed using SPSS, and a p value < 0.05 was considered significant.

Results

One hundred and sixty-five patients (41%) were anti-HCV positive, 234 (59%) HBsAg positive, and 32 (19%) of the 399 were both anti-HCV and HBsAg positive. In the HCV-positive patient group (table 1), 2 (1.5%) had type-1 DM, while 35 (21.2%) had type-2 DM. The mean age of the type-2 DM patients was 53.6 ± 14.4 years, while that of nondiabetics was 40.2 ± 16.5; the difference was statistically significant (p < 0.001). Most of the type-2 diabetics, 19 of 35 (54%), were using oral hypoglycemic agents, while 10 (29%) were on insulin, 5 (14%) on diet only and 1 (3%) on combined treatment. Liver biopsy was done in 43 patients (11 diabetics and 32 nondiabetics); 8 of the 11 (73%) diabetics and 20 of the 32 (62%) nondiabetics had mild steatosis, respectively. The prevalence of type-2 DM was greatest in patients who were non-Saudis, older than 40 years, had a high BMI and a frequent family history of DM. Compared to the nondiabetics, they were also more likely to have raised serum transaminases, low platelets, and histological evidence of cirrhosis.

In the HBsAg-positive patient group (table 2), 8 of 234 (3%) had type-1 and 33 (14.1%) had type-2 DM. The mean age of type-2 diabetics was 49.7 ± 13 years, while that for nondiabetics was 33.3 ± 14.6 years and the dif-

Table 1. Comparison between diabetic and nondiabetic patients with HCV infection

Variable	Type-2 diabetics n = 35	Non-diabetics n = 128	p value
<i>Age</i>			
>40 years	33 (94)	70 (55)	<0.001
<40 years	2 (6)	58 (45)	
<i>Sex</i>			
Males	21 (60)	79 (62)	0.85
Females	14 (40)	49 (38)	
<i>BMI</i>			
>25%	20 (57)	55 (43)	0.05
<25%	15 (43)	73 (57)	
<i>Nationality</i>			
Saudis	13 (37)	54 (42)	0.07
Non-Saudis	22 (63)	74 (58)	
Family history of diabetes	15 (43)	21 (16)	<0.001
Raised serum transaminases	25 (71)	72 (56)	0.03
Low platelets count	10 (29)	29 (23)	0.05
Cirrhosis on liver biopsy ¹	3 (27)	4 (13)	0.03

Figures in parentheses are percentages.

¹ Liver biopsy was done in 11 diabetics and 32 nondiabetics.

Table 2. Comparison between diabetic and nondiabetic patients with HBV infection

Variable	Type-2 diabetics n = 33	Non-diabetics n = 193	p value
<i>Age</i>			
>40 years	25 (76)	52 (27)	<0.001
<40 years	8 (24)	141 (73)	
<i>Sex</i>			
Males	17 (52)	79 (41)	0.26
Females	16 (48)	114 (59)	
<i>BMI</i>			
>25%	22 (67)	117 (61)	0.57
<25%	11 (33)	76 (39)	
<i>Nationality</i>			
Saudis	21 (64)	117 (61)	0.85
Non-Saudis	12 (36)	76 (39)	
Family history of diabetes	15 (45)	48 (25)	0.02
Raised serum transaminases	10 (30)	48 (25)	0.02
Low platelets count	5 (15)	14 (7)	0.16
Cirrhosis on liver biopsy ¹	1 (33)	5 (33)	1.0

Figures in parentheses are percentages.

¹ Liver biopsy was done in 3 diabetics and 15 nondiabetics.

ference was statistically significant ($p < 0.001$). Most of the diabetics, 21 of 33 (64%), were using oral hypoglycemic agents, while 6 (18%) were on diet only, 5 (15%) on insulin, and 1 (3%) on combined treatment. Liver biopsy was done in 18 patients (3 diabetics and 15 nondiabetics); mild steatosis was found in 1 of the 3 (33%) diabetics and 4 of the 15 (27%) nondiabetics. The prevalence of type-2 DM was greatest in older patients and in those who had a frequent family history of DM.

Discussion

In addition to liver involvement, HCV infections can cause extrahepatic diseases such as essential mixed cryoglobulinemia, sporadic porphyria cutanea tarda, and thyroid disorders, probably due to an interaction between HCV and the host immune system [10–13]. Mehta et al. [14] and Allison et al. [15] have reported that patients infected with HCV are 3–5 times more likely to have type-2 DM than those without HCV. Type-2 DM and insulin resistance syndrome have been hypothesized to constitute manifestations of an ongoing acute-phase response [16, 17]. This hypothesis is based on the findings of increased blood concentration in the acute-phase response markers, including C-reactive protein, serum amyloid-A, α_1 -acid glycoprotein, sialic acid cortisol [16–19], and interleukin-6, a cytokine involved in the regulation of acute-phase reaction and immune response [20]. Thus HCV might stimulate an immunological reaction that leads to a high prevalence of type-2 DM. Reports from different parts of the world have shown an increased prevalence of type-2 DM amongst patients with chronic HCV infection (24–62%) compared to persons with other forms of liver diseases [4, 21, 22]. Our study showed a prevalence of 21%, which is consistent with previous reports. A lower prevalence of type-2 DM was found in patients with HBV infection (14%), a finding that is also in agreement with previous reports of 8–12% [4, 6, 8, 9, 14]. An HCV infection may take 15 years or more to cause cirrhosis [23, 24]. Thus HCV infection might cause diabetes by another mechanism, e.g. as a result of progressive liver damage. This is supported by the observation that an increased prevalence of DM occurs mainly among HCV-infected patients with liver cirrhosis [6, 15, 25]. Caronia et al. [6] have reported that patients with cirrhosis had insulin resistance in addition to decreased acute insulin responsiveness. Mehta et al. [14] also found an association between the development of DM and a low platelet count, an early indication of hepatic dysfunction. Our study

showed that patients infected with HCV who developed type-2 DM were more likely to have a low platelet count, elevated transaminases and histological evidence of liver cirrhosis (table 1). On the other hand, no relation was found between HBV-infected patients who developed type-2 DM and chronic liver dysfunction (table 2).

BMI, age, ethnic origin, and a family history of DM also appear to be associated with type-2 DM patients infected with HCV (table 1). A high BMI, age and a strong family history of DM have been reported in type-2 DM patients infected with HCV [14], consistent with our findings. In agreement with our study, an association with ethnic origins has not been reported; whether ethnic origin plays a role in the development of DM needs further studies. Only age and a frequent family history of DM appear to be associated with type-2 DM patients infected with HBV (table 2). El-Zayadi et al. [7] had reported an increased prevalence of type-2 DM in the infected persons using insulin while in our study most of the patients were using oral hypoglycemic agents for blood glucose control.

Conclusion

Our findings indicate that type-2 diabetes was more common in patients with HCV than in those with HBV infections. Moreover, type-2 DM in the presence of an HCV infection appears to be associated with more clinical indications than type-2 DM in the presence of an HBV infection. Further studies are needed on this field which will be reflected by possible treatment or prevention of DM by antiviral agents or vaccination.

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